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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/025,974  | 12/19/2001  | Shawn Jay Cunningham | 1426/3/2            | 7819             |
| 25297   | 7590        | 11/04/2003           | EXAMINER            |                  |
| JENKINS & WILSON, PA<br>3100 TOWER BLVD<br>SUITE 1400<br>DURHAM, NC 27707 |             |                      | TAMAI, KARL I       |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2834                |                  |

DATE MAILED: 11/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/025,974             | CUNNINGHAM ET AL.   |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Tamai IE Karl          | 2834                |  |

-- **Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 5) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 6) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7&11/02. 6) ☐ Other:

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the actuator with curved stationary electrodes and bendable moving electrodes with an actuator moving in a linear direction must be shown or the features canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The examiner suggests "MEMS DEVICE HAVING A LINEAR ACTUATOR WITH CURVED ELECTRODES".

3. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims 1-25 contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. .

The specification does not enable or contain a full, clear, concise, and exact written description of an actuator with curved stationary electrodes and an moving bendable electrode which moved an actuator in an linear direction. The flexures connected to the beam electrodes and opposing actuators are essential to move the actuator in a linear direction without which the actuator would move in a curved direction as shown in the prior art, and therefore must be included in the claims.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: structure to move the actuator in a linear direction when the beam moves along the curved surface of the electrode. The actuator with curved electrodes being positioned on opposite sides of the actuating device and flexures between the electrodes and the actuating device are essential to the claimed linear motion of the actuating because without them the actuator would move in a curved path as shown in the prior art.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1, 4, 5, 12-14, 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Bonne et al. (Bonne)(US 5441597). Bonne teaches an actuator 180 having a curved electrodes 198 and a linear bending electrode 208. Bonne teaches the electrode secured to the substrate by a dielectric anchor integral with layer 94. Bonne teaches a flexible portion (around holes 206) between the valve bridge 192 and the electrode 208. Bonne teaches electrode on both sides of the bridge 192. Bonne teaches the dielectric layer on the electrode 208 forming a bumper to prevent electrical contact of the electrodes. Bond teaches a curved electrode 242 above the moving electrode 238.

11. Claims 1, 2, 4, 5, 9, 10, 12-14, 17, 19-22, 24, and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by McIntosh (US 6496348). McIntosh teaches an actuator with curved stationary electrodes with damping dielectric material 56 on opposite sides of the beam electrode 52, and having beams on opposite sides of the actuating device. The beam is anchored to the substrate and inherently includes a flexure integral with the beam 80.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 2, 9, 10, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonne et al. (Bonne)(US 5441597), in further view of Kaneko (JP 11-133210). Bonne teaches every aspect of the invention except the optical component with a light pathway, the electrode beam being straight and perpendicular to the linear direction, the curved surface is closer to the electrode beam away from the actuating device. Kaneko teaches a linear actuator with an optical component and light pathway. Kaneko teaches the electrode beam being straight and perpendicular to the linear direction, with the beam being closer to the curved surface away from the actuating device. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Bonne with the optical unit of Kaneko to provide a microminature actuator for a lens.

15. Claims 1-5, 8, 9, 10, 12, 14-17, and 19-22, 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Labeye et al. (Labeye)(US 5612815) and Ichiya et al. (Ichiya)(US 5544001). Labeye teaches an optical shutter 52 with bendable electrodes to move the shutter perpendicular to the direction the light. Labeye teaches the electrodes 80, 82 anchored to the substrate by frame 50 and to the shutter by a crab leg flexure (figure 4). Labeye teaches stationary electrodes on both sides of the moving beams. Labeye teaches every aspect of the invention except the stationary electrodes being curved with the smaller gap being way from the actuating device. Ichiya teaches the electrode having a curved surface to increase the electrostatic force near the actuated element with the smaller gap being way from the actuating device for providing greater electrostatic forces. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Labeye with the curved electrodes of Ichiya to increase the electrostatic forces on the actuated device.

16. Claims 6, 7, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Labeye et al. (Labeye)(US 5612815) and Ichiya et al. (Ichiya)(US 5544001) in further view of Sugiura (JP 09-159938). Labeye and Ichiya teach every aspect of the invention except the flexure being a double fold flexure. Sugiura teaches single, double and beams are know flexures used in MEMS devices. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Labeye and Ichiya with the single or double folded flexure of Sugiura to support the



mirror through rotational movement and because selection of know equivalents is within the ordinary skill in the art.

17. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Labeye et al. (Labeye)(US 5612815) and Ichiya et al. (Ichiya)(US 5544001). Labeye and Ichiya teach every aspect of the invention except the maximum separation between the electrodes being 35 or 50 micrometers. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Labeye and Ichiya with the maximum separation between the electrodes being 35 or 50 micrometers to provide efficient actuation of the device and because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (see *In re Aller*, 105 USPQ 233).

18. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Labeye et al. (Labeye)(US 5612815) and Ichiya et al. (Ichiya)(US 5544001), in further view of Cowen et al. (Cowen)(US 6229684). Labeye and Ichiya teach every aspect of the invention except the bumpers on the stationary electrodes. Cowen teaches electrically insulating bumpers 60 to prevent stiction. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Labeye and Ichiya with the bumpers of Cowen to prevent stiction.

19. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bonne et al. (Bonne)(US 5441597). Bonne teaches every aspect of the invention except the maximum separation between the electrodes being 35 or 50 micrometers. Bonne teaches the device being a microactuator. It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Bonne with the maximum separation between the electrodes being 35 or 50 micrometers to provide efficient actuation of the device and because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (see *In re Aller*, 105 USPQ 233).

20. Claims 24 and 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneko (JP 11-133210) and Bonne et al. (Bonne)(US 5441597). Kaneko teaches every aspect of the invention except the electrodes are inclined rather than curved. It is inherent that the end of the electrode beam 3 is a flexure integrally formed between the actuating device and the electrode. Bonne teaches the electrodes being curved (figure 11) or bent (figure 12). It would have been obvious to a person of ordinary skill in the art at the time of the invention to construct the device of Kaneko with the curved electrodes because Bonne suggests the electrodes can be either curve or bent, and because it is within the ordinary skill in the art to choose between known equivalents.

***Allowable Subject Matter***

21. Claim 23 is rejected over 35 USC 112, first and second paragraphs, but would be allowable if rewritten to include the flexure between the second bendable electrode and the actuating device.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karl I.E. Tamai whose telephone number is (703) 305-7066.

The examiner can be normally contacted on Monday through Friday from 8:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Nestor Ramirez, can be reached at (703) 308-1371. The facsimile number for the Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Karl I Tamai  
PRIMARY PATENT EXAMINER  
October 28, 2003

KARL TAMAI  
PRIMARY EXAMINER

